Patterns of Orthopedic Injuries Presenting to the Emergency Department of a Tertiary Hospital in Rural Nepal: A Descriptive Cross-sectional Study

Anup Mangal Samal[1*], **Bishal Rokaya**[1]

[1] Department of General Practice and Emergency Medicine, Karnali Academy of Health Sciences, Jumla, Nepal

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Abstract

Introduction: Orthopedic injuries (OIs) are one of the leading causes of trauma burden globally. The objective of this study is to determine and describe patterns of such injuries among patients presenting to the emergency department at Karnali Academy of Health Sciences (KAHS), a tertiary level general hospital in the mountainous region of Nepal.

Materials and Methods: A hospital based descriptive cross-sectional study was conducted in the Emergency Department (ED), KAHS over a period of 1 year. Convenience sampling method was used. All patients with OIs presenting on their first visit were included. Data related to socio-demographic variables, mechanism of injuries, types of injuries, and ED disposition outcomes were recorded in an ED registry. Statistical analysis was done using SPSS 22. Results were expressed in frequency and percentage.

Results: There were a total of 607 patients with OIs. Most patients with OIs belonged to age group less than 39 years (79.5%). Brahmin/ Chhetri comprised the most common ethnic group (64%). Fall and sports related injuries were the most common modes 57.5%) of injury. While soft tissue injuries comprised the most common diagnosis (50.5%), fracture and dislocation stood the second in list (30.5%). Most of the patients got discharged home from ED, approximately one of five required hospital admission (18%).

Conclusion: This study shows that orthopedic injuries contribute to a substantial burden of ED visits at a tertiary level hospital in a mountainous region of Nepal. The study identifies the vulnerable population and points out the most common etiology of injuries. This information may help to raise awareness, work on prevention strategies, and set clear targets for community-level safety interventions and work on enhancing trauma services in such rural settings in Nepal.

Keywords: *Emergency department; karnali; orthopedic injuries; trauma.*

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Corresponding Author

Anup Mangal Samal
Associate Professor, Department of General Practice and Emergency Medicine, Karnali Academy of Health Sciences, Jumla, Nepal.
Email: sam.anup@gmail.com
ORCID ID: **0000-0002-6276-938X**

Introduction

Orthopedic Injuries (OIs), otherwise known as traumatic injuries, are one of the leading causes of global disease burden and account for a significant proportion of years lived with disability. OIs are a broad category of medical conditions that involve damage to the musculoskeletal system, encompassing bones, joints, muscles, tendons, ligaments, and nerves. These injuries can range from sudden and acute traumas like fractures and dislocations to chronic and persistent conditions like tendonitis or osteoarthritis. Best available estimates of the overall incidence of musculoskeletal injury in low- and middle-income countries (LMICs) like Nepal range from 779 to 1574 per 100,000 person-years.[1] The fact sheet released by World Health Organization, 2024 reports that tens of

millions more people suffer non-fatal injuries each year which lead to emergency department and acute care visits, and hospitalizations.[2] Of all deaths occurring due to trauma and injuries, more than 90% have been reported in LMICs.[3] These injuries can occur for a range of reasons, including sports or recreational activities, falls, accidents, and chronic conditions. Studies have shown that in Southeast Asia, the burden of such injuries is further exacerbated by factors like road traffic accidents (RTAs), physical labor and falls.[4]

Orthopedic injuries can be a major contributor to trauma related morbidity particularly in resource constraint areas where there is limited access to specialized health care. Various factors like rugged geographical terrain, limited strategies to mitigate occupational hazards, and limited infrastructure amplify the burden of orthopedic injuries, especially in remote provinces like Karnali.[5] The Karnali Academy of Health Sciences (KAHS), a tertiary level hospital and teaching hospital is in a remote mountainous region at an altitude of 2,500 meters from sea level. KAHS serves a vast and underserved population of the region.

There are a few articles available on trauma and injuries in Nepal, but most of these studies represent an urban set-up. Data and information regarding orthopedic injuries in rural parts of Nepal remains scarce and there's a need to study on this topic to have facts and figures for reference. This study aimed to determine the epidemiological pattern, mechanisms, injury spectrum and emergency outcomes of orthopedic injuries presenting to a tertiary hospital in rural Nepal, thereby identifying gaps in trauma care and areas for intervention in remotely accessible rural part of Nepal.

Materials and Methods

This is a descriptive cross-sectional study conducted in the emergency department of KAHS over a 12-month period (January 2024 - December 2024).

Patients who visited the ED with acute nature of orthopedic injury, including all age groups, were considered eligible for participation in the study. Convenience sampling method was used. Subsequent follow-up visits for the same injury were not re-entered as a new case to avoid duplication. Those with chronic orthopedic conditions like pathological fracture, chronic bone disease, or those with post-operative conditions were excluded. Verbal consent was obtained from each participant, after explaining the nature and purpose of the study or from the patient's attendant if required. Those voluntarily denying participation were excluded. Details including socio-demographic information, mechanism of injuries, diagnosis, and disposition outcomes were recorded in a separate ED registry. Data collection was performed by the principal investigator, supported by a medical officer from the same department. To ensure competence and data reliability, the assisting medical officer underwent prior training and participating in pilot testing. Relevant data were initially recorded using a custom-developed data collection tool prior to transfer into the analytical software. Statistical analysis was done using SPSS 22. Results were expressed in frequency and percentage, classifying the types of OIs, etiology, and ED disposition (primary end point) with relation to demographic characteristics (secondary end point). Study approval was acquired from Institutional Review Committee, KAHS (Reference Number 2078/2079/39).

Results

Table 1: Demographic profile of patients

Variables	Category	Number of Patients	Percentage
Sex	Male	350	57.5
	Female	257	42.5
Age (years)	<18	231	38
	18–39	251	41.5
	40–59	92	15
	≥60	33	5.5
Ethnicity	Brahmin/Chhetri	389	64
	Dalit	172	28.3
	Jana Jati	20	3.3
	Other	26	4.3

Table 1 shows that there was a total of 607 patients. Children, adolescents, and adults (<39 years) represented the highest percentage of OIs (79.5%). Most of the patients belonged to the Brahmin/Chhetri (64%) ethnicity.

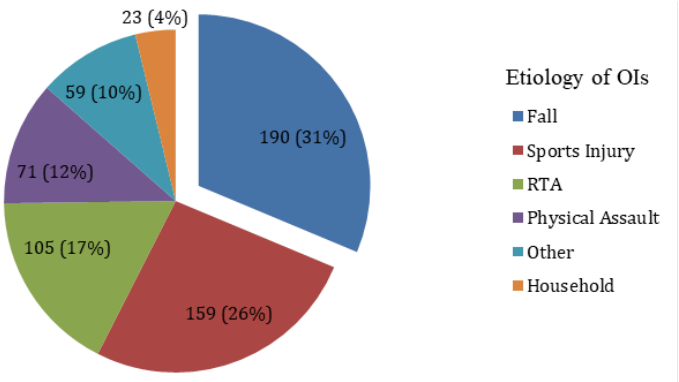


Figure 1: Etiology of Orthopedic Injuries

Figure 1 depicts that the leading causes of injury were falls (31%), sports related injuries (26%), and road traffic accidents (17%). The category 'other' constituted a total of 59 patients (10%) that included patients with occupational trauma, and degenerative etiologies of injuries like wear and tear related to age and autoimmune diseases.

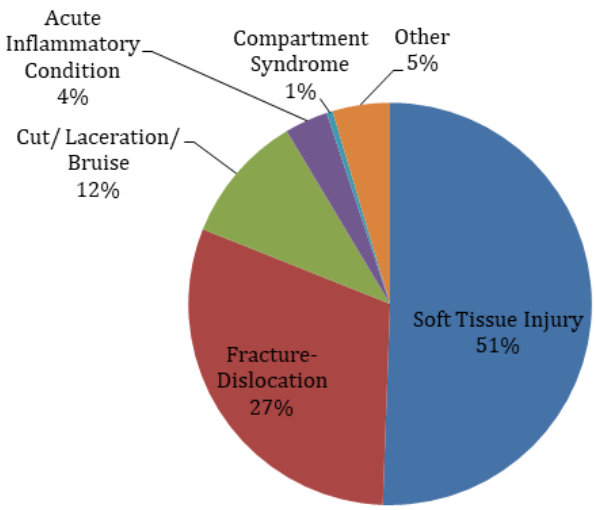


Figure 2: Types of Orthopedic Injury

Figure 2 shows that soft tissue injury (51%) and fracture-dislocation (27%) were the most common injuries.

Table 2: Patient Disposition

Disposition	Number of Patients (%)
Admission	110 (18)
Discharge	497 (82)

Table 2 shows that majority of patients with OIs got discharged from the ED (82%).

Discussion

This study reflects the pattern and characteristics of orthopedic injuries in a tertiary care hospital in rural Nepal at the Karnali Academy of Health Sciences (KAHS), Jumla. This study shows that most patients with such injuries belong to demographic age group 18-39 years, otherwise known as adults (41.5%). Adults have been noted to be the most common groups of people for OIs as observed with studies from other parts of Nepal and neighboring countries in both urban and rural setup.[6-9] It is seen that this age group that is a physically active population, is most vulnerable to injuries. Similar epidemiological trends have been published by a report by Nepal Health Research Council on injury and violence in Nepal, 2017 study in Eastern Nepal which states that adults are most vulnerable to injuries due to road traffic, occupational hazards, and sports.[10]

This study revealed that children and adolescents (<18 years) constituted 38% of overall burden of orthopedic injuries, the second largest population which is a comparable finding to results as observed by SS et. al in a medical college hospital in India [6]. This finding as well indicates the risk faced by young individuals to injury in unstructured environments and vulnerability to trauma. The high mountainous rugged geographic terrain of Karnali and outdoor lifestyles in the region may have contributed to these age-specific patterns.[5,11]

Etiology wise, this study identifies that falls (31.3%) and sports-related injuries (26.2%) were the most common causes of orthopedic injuries. It is a well-known phenomenon that residents of hilly regions have to navigate through rough terrains, poor road conditions and slopes regularly for daily mobility and work routines. Interestingly, this result diverges from results by urban data where road traffic accidents (RTAs) dominate the rest.[8,12,13] Considering the contrast of the etiology, the lower incidence of RTAs in this study may relate to less vehicular traffic in Karnali compared to urban Nepal. However, it is important to consider that poor road conditions, absence of protective gear, and overloading remains a significant RTA risk factor, especially in rural areas.[6,14]

This study revealed that soft tissue injuries (50.6%) were the most frequent type of injury, followed by fractures and dislocations (30.5%). Among fractures and dislocations, upper limb were the most affected body parts, as found in other studies in the region.[6,9] A study by Huda et al. also reported similar injury distribution in their analysis of orthopedic cases from a tertiary hospital in India.[7]

This study revealed that despite the significant burden of injuries, only 18% of patients required admission for further medical care, while the rest were discharged from the ED. This finding shows congruence with the study done by Bhatta S. et al. which showed that 80% of the patients with orthopedic injuries were discharged after primary care from the ED.[9] This could suggest that most cases were minor injuries and manageable in the emergency setting; however, in a different perspective, it may also reflect local sociocultural and logistical challenges in the region such as reluctance to stay in hospitals due to work or family obligations- a phenomenon noted in multiple rural healthcare studies from Nepal and India.[5,15-17]

Brahmin/Chhetri (64.1%) and Dalit (28.3%) were the most common ethnicities presenting with injuries. This predominance likely reflects local population demographics.[8] However, the reports from National Health Research Council (NHRC), and some community studies have indicated that marginalized groups, particularly Dalits, often experience delays or disparities in healthcare access.[10,18-19] This leaves ample room for further investigation and must be analyzed further in future research.

The findings of this study also instigate focusing on broader issues related to injury prevention and system readiness to trauma management. The NHRC's National Epidemiological Study on Injuries (2009) has highlighted the need for robust injury surveillance systems and community-based awareness interventions to reduce preventable trauma.[10] Other studies from Kathmandu and Eastern Nepal emphasized the lack of structured trauma protocols and the inadequate referral system, which are more relatable in remote districts like Jumla.[9,20,21] With recent development and new technologies, trauma has been

recognized to be preventable over the past few decades, and various scientific methods for injury prevention have been established.[4]

From a global perspective, the WHO Global Status Reports and other experts have emphasized the necessity for integrating safety and primary trauma-care into national health strategies, especially in LMICs.[16,22] Emergency trauma services in Nepal, including trauma service at KAHS, require targeted investment in infrastructure, skilled personnel, and better transport systems. The author believe that in remote areas, one of the most effective ways to bridge current gaps in service delivery could be ensuring the availability of general practitioners with basic orthopedic training, and assuring uninterrupted availability of surgical materials, and using alternative platforms like telemedicine as recommended by various authors.[16,23]

This study provides foundational evidence for stakeholders like local government, the local community, and hospital leadership to discuss strategies to develop injury prevention programs and enhance orthopedic trauma care. Examples may include programs on age-appropriate measures on fall prevention in schools and communities, regulations on sports safety, implementing strict road traffic rules, and appropriate training on trauma management.

Limitations of the Study

This is a hospital-based study and doesn't include cases that were managed at home, or those who never visited hospital. Thus, this study may not represent the real burden of injuries in the community and may inherently underestimate the real burden.

Conclusion

Orthopedic injuries are a commonly encountered entity and constitute a notable burden on emergency department in a tertiary level hospital in rural Nepal. Young adults and children are most affected and falls, and sports-related incidents are the leading causes. While soft tissue injuries top the list, injuries like fractures and dislocations are the second most prevalent injury types. These findings highlight a considerable need for targeted injury-prevention strategies- particularly focusing on fall and sports safety- alongside resource optimization to enhance trauma and orthopedic care in rural Nepal.

Recommendations

Many injuries are preventable. Injuries and violence are predictable and there is compelling scientific evidence for what works to prevent injuries [24]. The government and community stakeholders must work on identifying and implementing measures to minimize the burden of trauma by targeting environmental and occupational modifications and to ensure road safety.

Integrity and compliance statements

Ethics approval
Study approved by the Institutional Review Committee, KAHS on July 15, 2022 (Reference Number 2078/2079/39).

Informed consent
Written informed consent was obtained from all participants for data collection and publication of anonymous data.

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Conflict of Interest
The authors declare no competing interests.

Data availability
Data supporting the findings are available from the corresponding author on reasonable request.

Provenance and Peer Review
No generative AI or LLM tools were used in the preparation of this manuscript.

AI/LLM disclosure
No AI-assisted tools were used in this manuscript.

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Author Contributions (CRediT)

Anup Mangal Samal: design, concept, data collection, literature search, data analysis, manuscript preparation, manuscript review, and editing.

Bishal Rokaya: data collection and manuscript review.

Bios

Dr. Anup Mangal Samal, MD (General Practice and Emergency Medicine), Fellow (Fellowship in Emergency Medicine), Associate Professor and the head of the Department of General Practice and Emergency Medicine at Karnali Academy of Health Sciences, Jumla is involved in daily clinical activities, and medical academics at Karnali Academy of Health Sciences. Addiionally, he has also demonstrated keen interest in research in the field of medicine.

Dr. Bishal Rokaya is a medical officer in the Department of General Practice and Emergency Medicine at Karnali Academy of Health Sciences, Jumla. He has a keen interest in research in the field of emergency and trauma care.

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